



## Chapter Two

# AVIATION DEMAND FORECASTS

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# AVIATION DEMAND FORECASTS



Facility planning must begin with a definition of the demand that may reasonably be expected to occur at the facility over a specific period of time. In airport master planning, this involves forecasts of aviation activity indicators over a twenty-year planning period. In this master plan, forecasts of based aircraft, based aircraft fleet mix, and annual aircraft operations will serve as the basis for facility planning.

It is virtually impossible to predict with certainty year-to-year fluctuations of activity when looking twenty years into the future. Because aviation activity can be affected by many influences at the local, regional, and national level, it is important to remember that forecasts are to serve only as guidelines and planning must remain flexible enough to respond to unforeseen facility needs.

The following forecast analysis examines recent developments, historical information, and current aviation trends to provide an updated set of based aircraft and operational projections. The intent is to permit Pima County to make the planning adjustments necessary to ensure that the facility meets projected demands in an efficient and cost effective manner.

### ***NATIONAL AVIATION TRENDS***

Each year, the Federal Aviation Administration (FAA) publishes its national aviation forecast. Included in this publication are forecasts for air carriers, regional/commuters, general aviation, military, and FAA workloads. The forecasts are prepared to meet budget and planning

needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. When this chapter was prepared the current edition was *FAA Aviation Forecasts - Fiscal Years 1998-2009*. The forecasts use the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets.

For the U.S. aviation industry, the outlook for the next twelve years is for moderate economic growth. Fuel prices during this period are expected to rise at nearly the same rate as inflation, increasing at an average annual rate of 2.2 percent. Based on these assumptions, aviation activity by fiscal year 2009 is forecast to increase by 18.0 percent at combined FAA and contract towered airports and 23.1 percent at air route traffic control centers. In addition, the general aviation active fleet is projected to increase by almost 12.0 percent while general aviation hours flown are forecast to increase by 16.6 percent.

## GENERAL AVIATION

General aviation describes a diverse range of aviation activities which includes all segments of the aviation industry except commercial air carriers and military. General aviation (GA) is the largest component of the national aviation system and includes the production and sale of aircraft, avionics and other equipment, along with the provision of support services such as flight schools, fixed base operators, finance and insurance. The GA industry is an important contributor to the nation's economy. It provides on-the-spot efficient and direct

aviation services that commercial aviation either cannot or will not provide. After nearly a decade of decline, many statistical measures for general aviation have been generally positive over the past three years.

In 1997, general aviation completed its third year of operations following the passage of the General Aviation Revitalization Act of 1994 (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture). The high cost of product liability insurance was a major factor in the decisions by many American aircraft manufacturers to slow or discontinue the production of general aviation aircraft. Passage of this legislation sparked a renewed interest in the manufacturing of general aviation aircraft due to the reduction in product liability. So, while 1995 represented the beginning of renewed optimism for the GA industry, 1996 saw the industry convert this optimism into constructive actions that stimulated development and production of new general aviation products and services. By 1997, the industry began seeing the results of the renewed optimism and positive actions. While the results of the industry's performance in 1996 and 1997 are mixed, they are, overall, positive. The general aviation industry appears to have laid a solid foundation for growth over the next 12 years and into the foreseeable future.

By nearly any measure, 1997 was a very good year for general aviation. GA aircraft unit shipments were heading towards a third consecutive year of increase. Through the first 9 months of 1997, manufacturers shipped 954 aircraft, compared to 1,130 for all of 1996, and 1,077 for all of 1995. The number of units shipped in 1997 reflects an increase of 30.7 percent over the same 1996 period. Of more

importance, however, was that the renewed interest in piston-engine aircraft over the past three years (shipments up 15.4 and 4.2 percent, respectively for 1995 and 1996), continued to gain strength in 1997. Piston aircraft shipments for the first 9 months of 1997 totaled 561, increasing 46.9 percent over the same period in 1996. Additionally, 236 turbojets (up 46.9 percent) and 157 turboprops (down 20.3 percent) were shipped in this same period. Amateur-built aircraft continues to exhibit steady growth, just as it has over the past 25 years.

Billings for GA aircraft in 1996 totaled \$3.1 billion. During the first 9 months of 1997, billings have exceeded the entire 1996 figure, totaling nearly \$3.2 billion. This large increase in billings relative to shipments reflects, to a large extent, increased shipments of the generally higher priced turbojet aircraft.

Despite a small decline in the overall number of active pilots, the number of active student pilots increased from 94,947 for 1996 to 96,101 in 1997. This 1.2 percent increase marked the second consecutive yearly increase following steady declines in student pilot numbers since 1990. These student pilots are the future of general aviation and are one of the key factors impacting the future direction of the general aviation industry. This increase combined with the increases in piston-powered aircraft shipments and aircraft production are a signal that many of the industry initiated programs to revitalize general aviation, such as "GA Team 2000", have begun to have an effect.

The most notable trend in general aviation is the continued strong use of general aviation

aircraft for business and corporate uses. In 1996 (the latest year of recorded data), the number of hours flown by the combined use categories of business and corporate flying represented 22.5 percent of total general aviation activity; down slightly from 23.6 percent of total general aviation activity in 1995. The declines registered in the above categories reflect, to some extent, hours previously reported as business and corporate, now being reported as "public use", which is a new category added for 1996. Overall since 1991, the number of hours flown by the combined use categories of business and corporate flying represented 22.9 percent of total general aviation activity.

**Exhibit 2A** depicts the FAA forecast for active general aviation aircraft in the United States. The FAA forecasts general aviation active aircraft to increase at an average annual rate of 1.0 percent over the 13 year forecast period, increasing from 187,312 in 1996 to 212,960 in 2009. Over the forecast period, the active fleet is expected to increase by almost 2,000 annually considering approximately 2,000 annual retirements of older aircraft, and new aircraft production of nearly 4,000 annually. Turbine-powered aircraft are projected to grow faster than all other segments of the national fleet, growing 2.2 percent annually through the year 2009. This includes the number of turboprop aircraft increasing from 5,309 in 1996 to 6,482 in 2009 and the number of turbojet aircraft climbing from 4,287 in 1996 to 6,228 in 2009. Amateur-built aircraft are projected to increase at an average annual rate of 1.2 percent over the next twelve years, from 16,198 in 1996 to 18,622 in 2009.

## ***AIRPORT SERVICE AREA***

The initial step in determining aviation demand for an airport is to define its generalized service area for the various segments of aviation the airport can accommodate. The airport service area is determined primarily by evaluating the location of competing airports, their capabilities and services, and their relative attraction and convenience. With this information, a determination can be made as to how much aviation demand would likely be accommodated by a specific airport.

In determining the aviation demand for an airport, it is first necessary to identify the role of the airport. As noted in the previous chapter, the primary role of Avra Valley Airport is that of a reliever airport. Again, reliever airports are general aviation airports in metropolitan areas that are intended to reduce congestion at larger commercial service airports by providing general aviation with alternative landing sites, facilities, etc.

For Avra Valley Airport, the main service area is limited by both public and private-use airports in central and northeastern Pima County as well as southern Pinal County. These airports, previously described in Chapter One, provide competing levels of service to general aviation. The public-use airports include Tucson International Airport, Pinal Airpark and Ryan Field. Additionally, five other private airports or landing sites also listed in the preceding chapter may also effect the Airport's primary service area. Avra Valley Airport's draw from southern Pinal County communities maybe influenced by Pinal Airpark. However, actual public use of the general aviation facilities at Pinal Airpark is somewhat limited due to the extensive

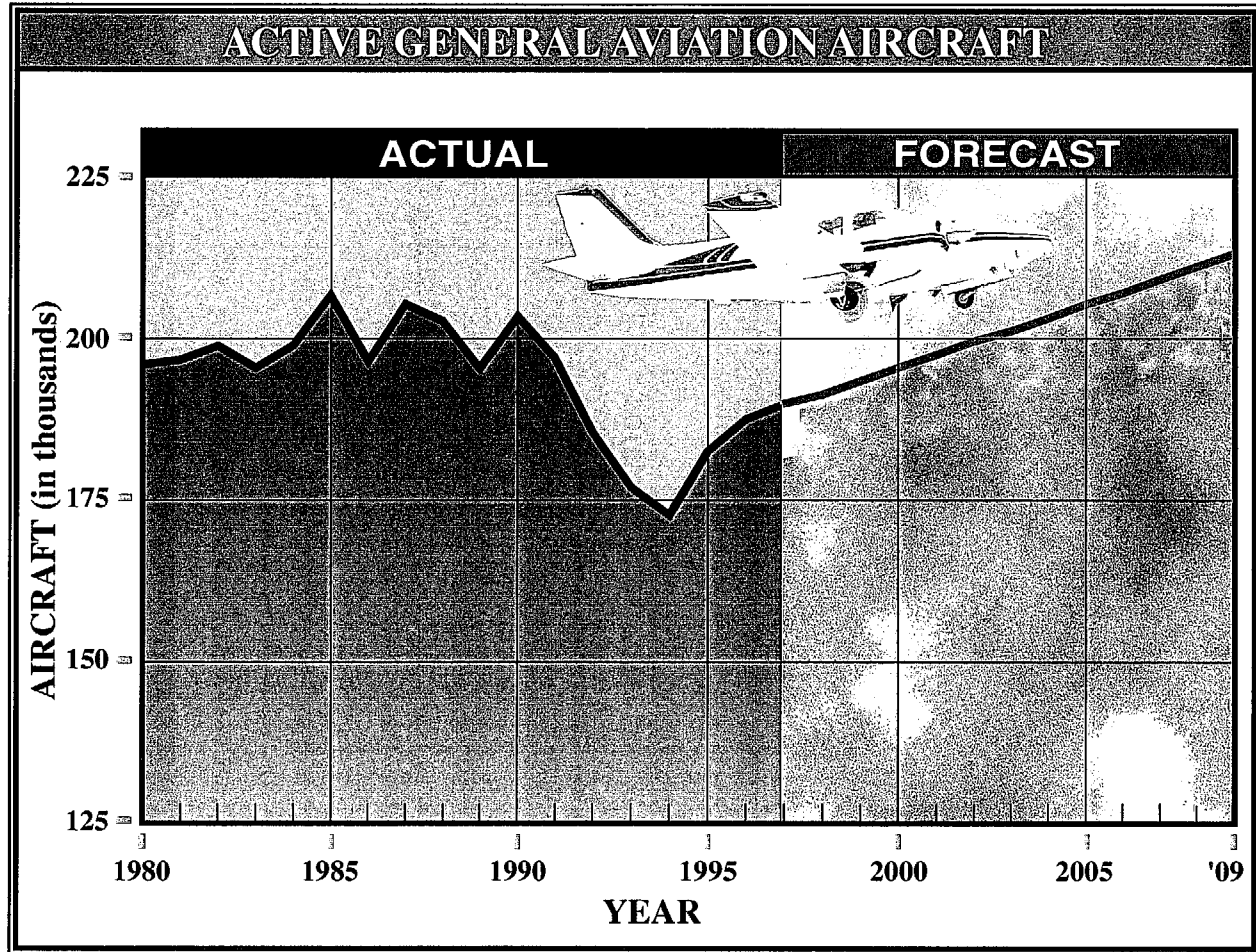
utilization of aircraft storage, parking and maintenance facilities by Evergreen Air Center, Inc. Meanwhile, Tucson International Airport and Ryan Field limit the airport's service area to the south. Other public-use airports, such as Casa Grande Municipal Airport, Eloy Municipal Airport, and Coolidge Municipal Airport, which are located in Pinal County may also slightly influence Avra Valley Airport's service area. These three airports are, however, outside the 30 nautical mile range considered to impact an airport's general service area.

Continued economic and population growth in Marana, North Tucson, and other surrounding communities will increase user demand at Avra Valley Airport as aircraft owners generally elect to base their aircraft close to their residences and/or businesses. The forecast analyses conducted in the following sections take into consideration the expected local and regional growth as well as the nearby airports which share a portion of the Avra Valley Airport service area.

## ***POPULATION PROJECTIONS***

Population growth is but one indicator of the potential for sustaining growth in aviation activity over the planning period. A summary of historical and forecast population for the Town of Marana, the City of Tucson, and Pima County is shown in **Table 2A**.

Between 1985 and 1995, Marana's population has increased by just over 3,000, with an average annual growth rate of 9.4 percent. Meanwhile, Tucson's population has increased by nearly 70,000, growing annually at 1.7 percent. Thirty-year projected population estimates for Marana show an



As of January 1	FIXED WING				ROTORCRAFT				
	PISTON		TURBINE		ROTORCRAFT		Experimental	Other	Total
	Single Engine	Multi- Engine	Turboprop	Turbojet	Piston	Turbine			
1997	136.7	15.8	5.3	4.4	2.4	4.0	16.4	4.2	189.3
2000	141.2	16.0	5.5	4.9	2.3	4.2	17.1	4.3	195.6
2003	145.3	16.2	5.8	5.4	2.2	4.4	17.7	4.4	201.4
2006	149.5	16.5	6.1	5.8	2.2	4.5	18.1	4.5	207.2
2009	153.7	16.6	6.5	6.2	2.1	4.6	18.6	4.6	213.0

**Source:** FAA Aviation Forecasts, Fiscal Years 1998-2009.

**Notes:** Detail may not add to total because of independent rounding. An active aircraft must have a current registration and it must have been flown at least one hour during the previous calendar year.



average annual growth rate of 9.9 percent, with an expected population of nearly 90,000 by the year 2025. Tucson, however, shows an annual growth rate of 1.1 percent for the same period when the population is expected to number over 612,000. Pima County grew by approximately 134,000 people, an annual average growth of 2.0 percent from 1985 through 1995. The County's projected population total for the year 2025 is 1,291,000 which translates to an average annual growth rate of 1.8 percent.

### ***ECONOMIC OUTLOOK***

During 1996, Arizona remained one of the nation's "hot spots", ranking near the top for employment, personal income and other economic indicators. Reflections of these rankings can be seen in the economic forecasts for the Tucson Metropolitan Area and the Town of Marana. According to The University of Arizona's College of Business

and Public Administration's Annual Forecast, *Economic Outlook 97/98*, job growth for 1990-1995 in the Tucson Metropolitan Area (TMA) showed an average annual average increase of 3.7 percent, while average annual income rose 6.0 percent in 1995, the fifth largest increase in the nation. Residential building permits (both single and multi-family units) numbered 8,017 for 1995. The Consumer Price Index (CPI), Western Region number used for the TMA in 1995 was 2.5 percent, which closely mirrored the state and national trend. The Town of Marana, located on the Interstate 10 (I-10) "transportation corridor" between Tucson and Phoenix, is home to a growing number of commercial, industrial, and residential housing developments. Several nationally recognized major retailers have locations in the area. Continental Ranch Industrial Park is fully developed on 275 acres, while more than 2,000 acres near I-10, the Southern Pacific Railroad, and Avra Valley Airport are zoned for industrial use.

**TABLE 2A**  
**Historical and Projected Population**

Year	Town of Marana	City of Tucson	Pima County
<i>Historical</i>			
1985	2,095	377,545	624,300
1990	2,187	405,390	666,957
1995	5,160	447,075	758,050
<i>Forecast</i>			
2005	29,518	508,521	943,800
2015	62,328	565,736	1,119,350
2025	88,678	612,051	1,291,000

Source: Arizona Department of Economic Security, Research Administration,  
Population Statistics Unit, December 1997

According to the *Town of Marana, General Plan* dated February 4, 1997, the population of Marana will more than double the 1995 total of 5,160 by the year 2000, likely surpassing 40,000 by 2010. The median household income for Marana of \$22,445 in 1990, is increasing faster than the Pima County average. Town revenues for 1995 as compared to 1990, grew an estimated 462 percent. This translates to an annual average increase of 72.5 percent, while Pima County by comparison grew at 1.0 percent over the same period. It should be noted that housing construction represented about 90 percent of current activity, and that much of the increased revenue resulted from annexation. The Town of Marana staff has estimated that an additional 40,000 housing units have been approved in the adopted specific plans within the Town. These plans include Acacia Hills in the Linda Vista/Interstate 10 area, Continental Ranch (along Silverbell Road), and Dove Mountain (north of Tangerine).

In summary, according to *Economic Outlook 97/98*, the overall outlook for Pima County, the Tucson Metropolitan Area, and The Town of Marana is for continued economic expansion. Moderate growth along with low inflation and low interest rates are expected.

## **GENERAL AVIATION FORECASTS**

To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. Indicators of general aviation demand include: based aircraft, the based aircraft fleet mix, annual operations, and peak activity. The remainder of this chapter will examine historical trends with regard to these areas of general aviation

and project future demand for these segments of general aviation activity at the airport.

## **BASED AIRCRAFT**

The number of based aircraft is the most basic indicator of general aviation demand at an airport. By first developing a forecast of based aircraft, the growth of aviation activities at the airport can be projected. In the preparation of based aircraft forecasts for Avra Valley Airport, historical data relating to based aircraft at the Airport was reviewed. ADOT's Aeronautics Division and the FAA maintain historical records concerning based aircraft at Arizona's public-use airports. Meanwhile, the Pima Association of Governments (PAG) also compiles based aircraft records regarding the County's public airports. ADOT's based aircraft totals are obtained from aircraft registrations, while based aircraft totals for the FAA are derived from an annual inspection of the airport. PAG on the other hand uses the FAA annual inspection reports (Form 5010) as well as airport records and interviews with airport tenants and staff. In 1996, according to ADOT records, there were 87 aircraft registered with the State as based at Avra Valley Airport. FAA records for the same year indicate 182 based aircraft. This discrepancy in based aircraft totals is due to the methodology that each agency uses to arrive at its based aircraft numbers. For purposes of determining future on-airport facility needs and deriving on-airport based aircraft trends, this master plan will utilize historical based aircraft totals provided by PAG, the FAA, and Tucson Aeroservice Center, Inc., as these appear to more closely approximate actual historical based aircraft utilizing on-airport facilities. **Table 2B** summarizes historical based aircraft at Avra Valley Airport and

historical registered aircraft in Pima County.  
As evidenced in the table, based aircraft totals

for the airport have nearly doubled in the last  
ten years, from 107 in 1987 to 206 in 1997.

<b>TABLE 2B</b>			
<b>Historical and Forecast Based Aircraft and Pima County Registered Aircraft</b>			
<b>Year</b>	<b>Pima County Registered Aircraft</b>	<b>Avra Valley Airport Based Aircraft</b>	<b>Percent of Pima County Registered Aircraft Based At Avra Valley</b>
<b><i>HISTORICAL</i></b>			
1984	739 <sup>1</sup>	120 <sup>1</sup>	16.2
1985	727 <sup>1</sup>	95 <sup>1</sup>	13.1
1986	749 <sup>1</sup>	95 <sup>1</sup>	12.7
1987	793 <sup>1</sup>	107 <sup>1</sup>	13.5
1988	836 <sup>1</sup>	120 <sup>1</sup>	14.4
1989	848 <sup>1</sup>	120 <sup>1</sup>	14.2
1990	876 <sup>1</sup>	123 <sup>1</sup>	14.0
1991	871 <sup>1</sup>	126 <sup>1</sup>	14.5
1992	888 <sup>1</sup>	139 <sup>1</sup>	15.7
1993	900 <sup>1</sup>	151 <sup>1</sup>	16.8
1994	915 <sup>4</sup>	161 <sup>4</sup>	17.6
1995	930 <sup>4</sup>	172 <sup>4</sup>	18.5
1996	944 <sup>4</sup>	182 <sup>2</sup>	19.3
1997	958 <sup>4</sup>	206 <sup>3</sup>	21.5
<b><i>FORECASTS</i></b>			
<b>Constant Market Share</b>			
2000	1013 <sup>1</sup>	218	21.5
2005	1090 <sup>1</sup>	234	21.5
2010	1177 <sup>3</sup>	253	21.5
2015	1264 <sup>3</sup>	272	21.5
2020	1360 <sup>1</sup>	292	21.5
<b>Increasing Market Share</b>			
2000	1013 <sup>1</sup>	248	24.5
2005	1090 <sup>1</sup>	322	29.5
2010	1177 <sup>4</sup>	377	32.0
2015	1264 <sup>4</sup>	426	34.5
2020	1360 <sup>1</sup>	503	37.0
Sources:			
<sup>1</sup> Pima Association of Governments, Regional Aviation System Plan, Summary Report, February 1995			
<sup>2</sup> FAA 5010 Form, Airport Master Record (Inspection Date: June 5, 1996)			
<sup>3</sup> Tucson Aeroservice Center, Inc., February 1998			
<sup>4</sup> Extrapolated by Coffman Associates.			

A market share analysis of national aircraft totals has also been conducted and is summarized in **Table 2C**. As indicated by the table, Avra Valley Airport's based aircraft market share for U.S. active aircraft increased

between 1984 and 1997, decreasing slightly in 1985. Two market share forecasts are presented in **Table 2C**. First, a constant, or static market share of based aircraft was applied to U.S. active aircraft forecasts.

<b>TABLE 2C</b> <b>Regional and National Active Aircraft Market Share Analyses</b>			
<b>Year</b>	<b>Avra Valley Municipal Airport Based Aircraft</b>	<b>U. S. Active Aircraft</b>	<b>% of U. S. Active</b>
1984	120	199,000	0.060
1985	95	203,000	0.047
1986	95	196,500	0.048
1987	107	205,300	0.052
1988	120	202,700	0.059
1989	120	196,200	0.061
1990	123	205,000	0.060
1991	126	198,000	0.064
1992	139	185,650	0.075
1993	151	177,210	0.085
1994	161	172,935	0.093
1995	172	182,605	0.094
1996	182	187,312	0.097
1997	206	189,328	0.109
<b>FORECASTS</b>			
<b>Year</b>	<b>Based Aircraft</b>	<b>U.S. Active Aircraft</b>	<b>% of U.S. Active</b>
<b>Constant Share</b>			
2000	215	195,635	0.11
2005	226	205,274	0.11
2010	237	215,090	0.11
2015	249	226,062	0.11
2020	261	237,593	0.11
<b>Increasing Share</b>			
2000	254	195,635	0.13
2005	308	205,274	0.15
2010	366	215,090	0.17
2015	430	226,062	0.19
2020	499	237,593	0.21
Source for Historical and Forecast U.S. Active Aircraft - <i>FAA Aviation Forecasts - Fiscal Years 1998-2009</i>			

Maintaining a constant market share of U.S. active aircraft, Avra Valley Airport can expect 261 based aircraft by 2020. Again, based upon the growth potential of the local and regional area, it is likely that the market share of aircraft based at the airport will increase. According to the table, an increasing market share of U.S. active aircraft (0.21 percent)

yields 499 aircraft for the year 2020. The 1995 *PAG RASP*, the 1995 *SANS*, the 1987 Master Plan, as well as the Aircraft per 1,000 Pima County Residents, and the Aircraft per 1,000 Persons Employed (Pima County) depicted in **Table 2D** all provide comparative forecasts. These forecasts are based on different base years as well as varied data sources.

TABLE 2D Aircraft Per 1,000 Residents in Households and Per 1,000 Persons Employed Avra Valley Airport					
Year	Based Aircraft	Pima County Residents	Aircraft per 1,000 Residents	Tucson Metropolitan Area (MPA) Total Employment	Aircraft per 1,000 Persons Employed
1990	123	666,957	0.18	301,700	0.41
1995	172	758,050	0.23	302,600	0.57
1997	206	799,375	0.26	313,400	0.66
Forecasts					
Year	Based Aircraft	Pima County Residents		Aircraft per 1,000 Residents	
2000	256	854,325		0.30	
2005	311	943,800		0.33	
2010	361	1,031,625		0.35	
2015	403	1,119,350		0.36	
2020	434	1,206,250		0.36	
Year	Based Aircraft	Tucson (MPA) Total Employment		Aircraft per 1,000 Persons Employed	
2000	227	324,600		0.70	
2005	255	349,200		0.73	
2010	282	371,400		0.76	
2015	306	391,800		0.78	
2020	328	410,125		0.80	
Population and Employment Data Source: Arizona Department of Economic Security, December 1997					

A summary of all forecasts for based aircraft at Avra Valley Airport and the selected planning forecast is presented in **Table 2E**, and on **Exhibit 2B**. The planning forecast is a median range projection which reflects the airport capturing a larger portion of regional and national aviation markets over the planning period. Continued local and regional economic and population growth supports the long-range potential for based aircraft growth at the airport. The planning forecast projects based aircraft at Avra Valley Airport growing at an average annual rate of 3.4 percent. In all likelihood, actual activity will not follow any

one of the projections exactly. It is more likely that based aircraft levels will fluctuate within the range of the projections depicted on **Exhibit 2B**. Thus, these lines serve more as a planning envelope. The planning envelope reflects a reasonable range for based aircraft at the airport. With this in mind, the time-based projections of anticipated growth should serve only as a guide. At any given time over the planning period, the actual level of based aircraft could fall within the envelope area defined by the lower range forecast numbers and the higher range forecast numbers.

**TABLE 2E**

**Based Aircraft Forecast Summary**

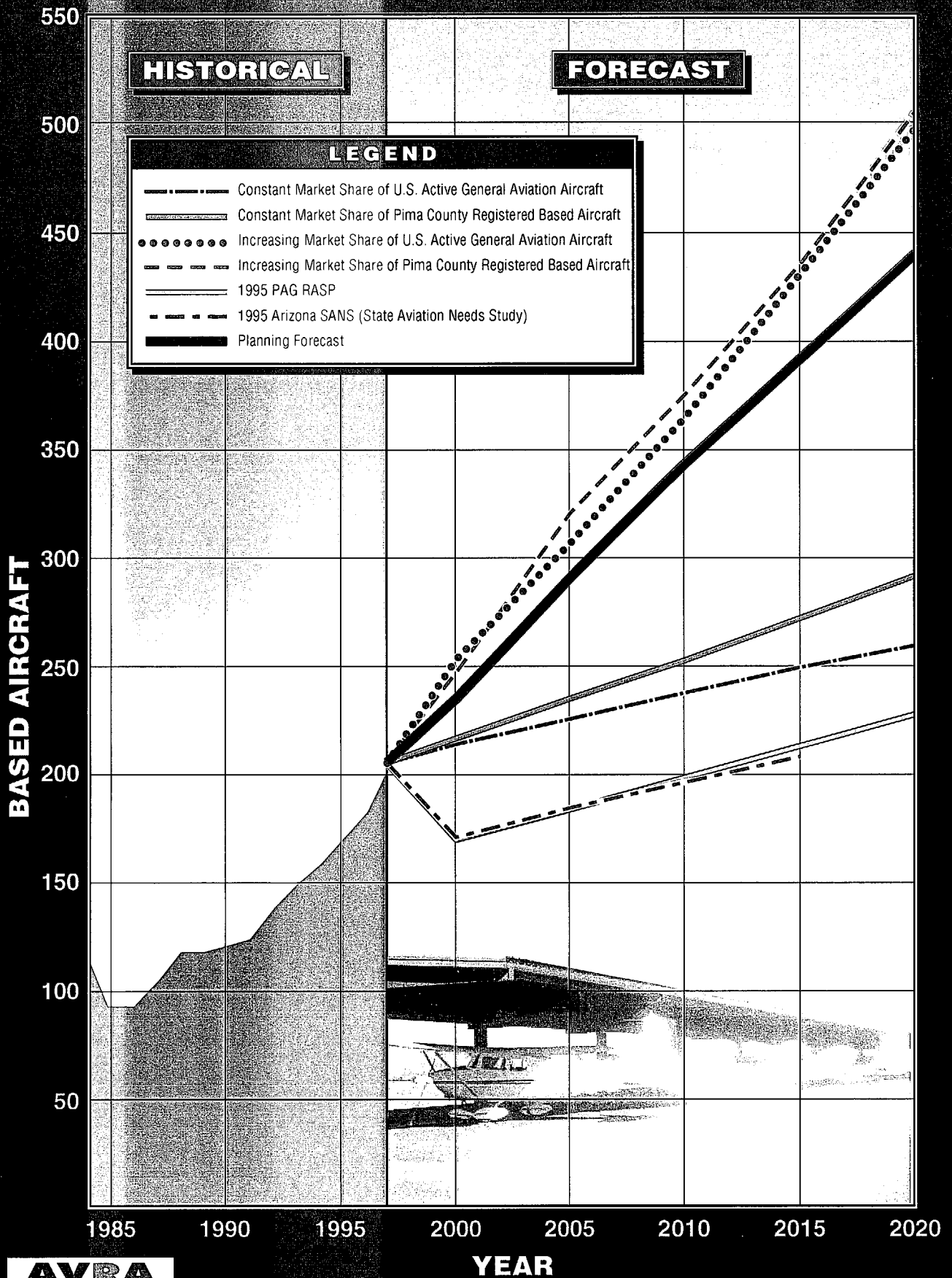
	2000	2005	2010	2015	2020
<i>Constant Market Share of:</i>					
U.S. Active General Aviation Aircraft	215	226	237	249	261
Pima County Registered Based Aircraft	218	234	253	272	292
<i>Increasing Market Share of:</i>					
U.S. Active General Aviation Aircraft	254	308	366	430	499
Pima County Registered Based Aircraft	248	322	377	436	503
<i>Other Forecasts:</i>					
1995 PAG RASP	170	183	N/A	N/A	228
1995 Arizona SANS (State Aviation Needs Study)	171	184	196	209	N/A
1987 Master Plan	306	420	N/A	N/A	N/A
Aircraft per 1,000 Pima County Residents	256	311	361	403	434
Aircraft per 1,000 Persons Employed (Pima County)	227	255	282	306	328
<i>Planning Forecast</i>	<i>235</i>	<i>290</i>	<i>341</i>	<i>392</i>	<i>440</i>

**FLEET MIX**

Knowing the aircraft fleet mix expected to utilize the airport is necessary to properly plan the facilities that will best serve not only the level of activity but also the type of activities occurring at the airport. The 1997 total of 206 based aircraft was comprised of 161 single engine aircraft, 31 multi-engine, 10

turboprops, 3 jets (1 business jet, 2 microjets), and 1 helicopter. The based aircraft and fleet mix information was provided by Tucson Aeroservice Center, Inc., the main FBO at Avra Valley Airport.

The forecast mix of based aircraft was determined by examining existing and forecast U.S. general aviation fleet trends. The



FAA Aviation Forecasts Fiscal Years 1998-2009 was consulted for the U.S. general aviation fleet mix trends and considered in the fleet mix projections. The fleet composition of based aircraft at Avra Valley Airport is expected to remain heavily in single-engine

piston aircraft, although there is expected to be an increasing percentage of multi-engine, turboprop, jet, and helicopters in the future mix, consistent with national trends. **Table 2F** summarizes the based aircraft fleet mix projections for the airport.

<b>TABLE 2F</b>						
<b>Projected Based Aircraft Fleet Mix</b>						
<b>Year</b>	<b>Total Based Aircraft</b>	<b>Single Engine</b>	<b>Multi Engine</b>	<b>Turbo Prop</b>	<b>Jet</b>	<b>Helicopter</b>
<i>Historical</i>						
1997	206	161	31	10	3	1
<i>Forecast</i>						
2000	235	183	34	12	4	2
2005	290	218	45	19	5	3
2010	341	252	56	25	6	6
2015	392	282	62	32	8	8
2020	440	311	69	41	9	10

## ANNUAL OPERATIONS

There are two types of general aviation operations at an airport: local and itinerant. A local operation is a take-off or landing performed by an aircraft that operates within site of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and industry use since business aircraft are used primarily to carry people from one location to another. Due to the absence of an airport traffic control tower at the airport, aircraft operations have not been regularly counted. Instead, only general estimates of historical and current activity is available. **Table 2G** summarizes historical

operational estimates for the airport. Based upon operational estimates provided by Tucson Aeroservice Center, total operations in 1997 have been estimated at 71,300. The operations data source for 1993 (48,300 operations) was the 1995 PAG RASP, while the 1985 data came from the *1987 Avra Valley Airport Master Plan Study*, which employed an aircraft activity monitoring program and fuel sales records in arriving at the estimated 34,000 operations for the year 1985. Similar to based aircraft, regression and trend line analyses did not provide reasonable correlations for use in developing reliable operations forecasts. The projections of annual operations at Avra Valley Airport shown in **Table 2H**, have, therefore, been prepared by examining the number of operations per based aircraft summarized in the above table.

**TABLE 2G****Historical Operations Estimates**

Year	Based Aircraft	Annual Operations	Operations Per Based Aircraft
1985 <sup>1</sup>	118	34,000	288
1993 <sup>2</sup>	151	48,300	320
1997 <sup>3</sup>	206	71,300 <sup>4</sup>	329

Sources: <sup>1</sup> *Avra Valley Airport Master Plan Study, Activity Monitoring Program*, Oct.-Nov. 1985, Coffman Associates, Inc.

<sup>2</sup> Pima Association of Governments, *Regional Aviation System Plan*, Summary Report, February 1995

<sup>3</sup> Tucson Aeroservice Center, February 1998

<sup>4</sup> Tucson Aeroservice Center, October 1996 through October 1997

**TABLE 2H****Annual Operations Forecast Summary**

	2000	2005	2010	2015	2020
Constant Number of Operations per Based Aircraft	77,315	95,410	112,189	128,968	144,760
Increasing Number of Operations per Based Aircraft	78,960	100,920	122,760	145,824	169,400
FAA's Projected 1.5 Percent Annual Increase	76,810	82,746	89,141	96,030	103,452
1995 PAG RASP	54,668	58,914	N/A	N/A	70,187
1995 Arizona SANS	34,200	36,800	39,200	41,800	N/A
1987 Master Plan	137,700	210,000	N/A	N/A	N/A
<b>Planning Forecast</b>	<b>78,000</b>	<b>97,000</b>	<b>115,000</b>	<b>133,000</b>	<b>150,000</b>

For forecasting purposes, two forecasts of operations per based aircraft have been developed. First, a constant, or static level of 329 operations per based aircraft was applied to forecast based aircraft. This results in an operational level of 144,760 in 2020. Continuing growth in North Tucson and Marana, potential new airport tenants and businesses, and increased business and corporate aircraft activity has the potential of contributing to additional airfield activity.

An increasing operation per based aircraft forecast has been developed to account for this additional activity. This results in an operational level of 169,400 in 2020. Both of these operational totals are based on the

planning forecast of 440 based aircraft at Avra Valley Airport.

The FAA's Projected 1.5 Percent Annual Increase (total operations) projects 103,452 operations by the year 2020. The 1995 SANS forecasts annual operations growing to 41,800 by the year 2015 for Avra Valley Airport. The 1995 PAG RASPS predicts 70,187 operations in 2020, while the 1987 Master Plan predicted 210,000 operations for 2005 which was the limits of the planning envelope for the master plan. These additional forecasts, based on different variables, are provided to further define the operational "forecast envelope" of the current planning period.

**Exhibit 2C** presents the planning forecast and “forecast envelope”. The additional activity resulting from growth both on and around the airport property will continue to drive the number of annual operations at Avra Valley Airport and likely contribute to an increase in the number of annual operations at the airport. The planning forecast accounts for this additional activity as well as additional activity resulting from increased numbers of based aircraft and increased itinerant use of the airport. The planning forecast projects annual operations at Avra Valley Airport growing at an average annual rate of 3.3 percent.

Local operations are estimated to account for a larger portion of total annual operations than itinerant operations. Traditionally, local operations reflect training operations. At Avra Valley Airport, however, the majority of local operations are attributable to the large number of operations conducted by Marana Skydiving and Tucson Aeroservice Center’s flight training, aircraft rental and charter services. Operations of this type can be considered “local” since these aircraft operate in surrounding areas, close to the airport. By the very nature of their services, this requires them to use the airport exclusively without landing at a separate destination airport. Currently, local operations are estimated to account for approximately 70 percent of total annual operations. Itinerant operations are forecast to increase through the planning period (in number and as a percentage of total annual operations) due to the expected increased utilization of business and corporate aircraft at the airport (which are typically itinerant operations). The projection of local and itinerant operations are summarized in the table at the end of this chapter.

## ***PEAKING CHARACTERISTICS***

Many airport facility needs are related to the levels of activity during peak periods. The periods used in developing facility requirements for this study are as follows:

- ***Peak Month*** - The calendar month when peak aircraft operations occur.
- ***Design Day*** - The average day in the peak month. Normally this indicator is easily derived by dividing the peak month operations by the number of days in a month.
- ***Busy Day*** - The busy day of a typical week in the peak month. This descriptor is used primarily to determine apron space requirements.
- ***Design Hour*** - The peak hour within the design day. This descriptor is used primarily in airfield demand/capacity analyses, and in determining terminal building and access road requirements.

Adequate historical operational information is not available to directly determine peak aviation activity at the airport; therefore, peak period forecasts have been determined from an evaluation of Tucson Aeroservice Center’s monthly fuel sales records covering the period from January 1995 through October 1997. Typically, nationwide, the peak month for activity at general aviation airports approximates 10-12 percent of an airport’s annual operations. However, an examination of TAC’s fuel sales records indicates peak month activity to be closer to 15 percent for

Avra Valley Airport. Therefore, peak month operations have been estimated as 15 percent of annual operations. The forecast of busy day operations at the airport was calculated as 1.25

times design day activity. Design hour operations were calculated as 13.0 percent of design day operations. **Table 2J** summarizes peak activity forecasts for the airport.

**TABLE 2J**  
**Peak Period Forecasts**

	2000	2005	2010	2015	2020
Annual Operations	78,000	97,000	115,000	133,000	150,000
Peak Month	11,700	14,550	17,250	19,950	22,500
Design Day	385	478	567	656	740
Busy Day	481	598	709	820	925
Design Hour	50	62	74	85	96

### **FORECAST SUMMARY**

This chapter has outlined the various aviation demand levels anticipated over the planning period. The next step in the master plan is to assess the capacity of existing facilities to accommodate forecast demand and determine

which facilities will need to be improved to meet these demands. This will be examined in the next chapter -- Chapter 3, Aviation Facility Requirements. **Table 2K** presents a summary of the aviation forecasts developed for Avra Valley Airport.

**TABLE 2K**  
**Aviation Forecast Summary**

	1997 <sup>1</sup>	2000	2005	2010	2015	2020
Annual Operations						
Itinerant Operations	22,800	28,080	38,800	48,300	59,850	72,000
Local Operations	<u>48,500</u>	<u>49,920</u>	<u>58,200</u>	<u>66,700</u>	<u>73,150</u>	<u>78,000</u>
Total Annual Operations	71,300	78,000	97,000	115,000	133,000	150,000
Based Aircraft	206	235	290	341	392	440

<sup>1</sup>Tucson Aeroservice Center, Inc.

ANNUAL OPERATIONS (in thousands)

**LEGEND**

- Constant Number of Operations per Based Aircraft
- Increasing Number of Operations per Based Aircraft
- FAA's Projected 1.5 Percent Annual Increase
- 1995 PAG RASP
- - - 1995 Arizona SANS
- - - 1987 Master Plan
- Planning Forecast

**HISTORICAL****FORECAST**